

Passively Cooled Reconnaissance of the Interstellar Medium

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In the context of “faster, cheaper, better,” this mission seeks to break new ground in the field of science. The interstellar medium has never before been directly investigated. By taking advantage of a satellite in Sun-synchronous orbit around the Earth and the Earth’s orbit around the Sun, a spectrometer pointed outward could, in principle, sweep out the entire sky in just 6 months. Cheaper, gravity-gradient stabilization could be employed, and the satellite could be launched via a low-cost Pegasus-class bus.

The Passively Cooled Reconnaissance of the Interstellar Medium would survey the galaxy at infrared lines extremely difficult to see from the ground. These lines would provide valuable data on the characteristics of the interstellar medium. Densities, velocities, and temperatures as a function of position will allow tremendous insight into where new stars are forming and in the evolutionary processes at work in our galaxy. Ordinary telescopes operating in the visible cannot see the center of the galaxy because of intervening clouds, but this mission will enable scientists to see beyond the clouds to study the mysteries at the center.

In addition, a substantial technological benefit may be realized in the areas of passive cooling of

satellites. Present technology uses large, heavy, bulky dewars to cool the temperature of the telescope down to acceptable cryogenic temperatures. These dewars are inherently expensive and costly. This program would employ an alternate approach in which a system of nested, conical Sun shields would provide the necessary cooling passively. Indeed, MSFC could become the center of expertise for passive cooling.

Sponsor: Advanced Systems and
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